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Mount St. Helens Geological Area • Gifford Pinchot National Forest

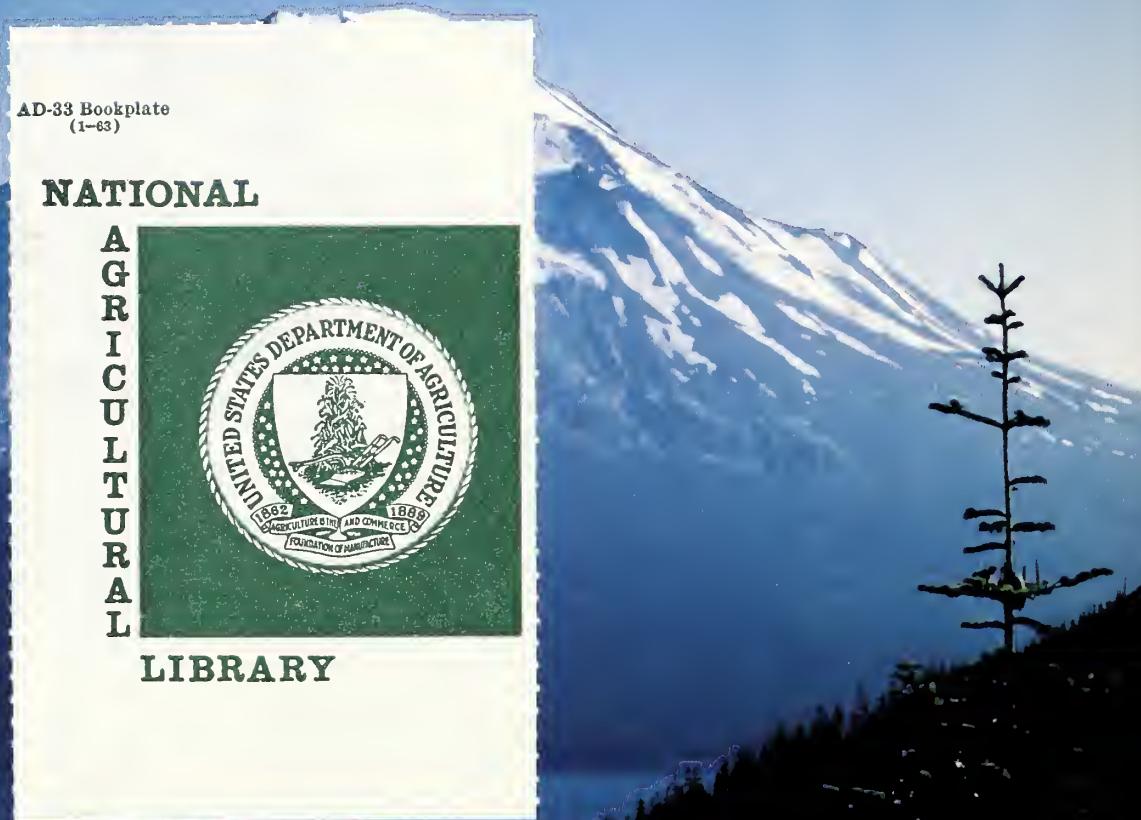
U.S. Department of Agriculture  Forest Service • Pacific Northwest Region



A beautiful, serene lake sheltered by lush forests. A tall, symmetrical, snow-capped peak dominating the skyline. A mountain graced with the beauty of geologic youth. These are the memories of Mount St. Helens . . . landmarks of the Pacific Northwest forever changed by one of the most cataclysmic events witnessed on the North American Continent.



An explosive volcanic eruption. The Sleeping Mountain Awakes. Scientists had predicted a reawakening of volcanic activity on Mount St. Helens. The geologic history of the mountain, including recorded accounts of activity in the early-to-mid 1800's told them the mountain was only sleeping, not extinct. On March 20th, 1980, an earthquake measured at 4.1 on the Richter Scale announced to the world Mount St. Helens was stirring. Earthquakes continued with increasing frequency until by March 27, it was difficult to distinguish between individual earthquakes due to the constant shaking of the ground.





# Mount St. Helens



Early April, 1980... erupting steam adds to mystique of still-beautiful Mount St. Helens.



May 18, 1980, 8:32 a.m.... Apocalyptic Sunday...



... north side of Mount St. Helens explodes

## A Crater Is Torned

When an eruption just after noon on March 27 blasted a crater in glacial ice near the summit, Mount St. Helens' 123-year sleep was over. Additional eruptions throughout the evening of the 27th enlarged the initial crater and threw pulverized rock and steam into the night sky. By mid-morning March 28, a second crater had formed near the first. During the next few days, explosions enlarged both craters until they joined and continued growing as one crater.

## The Mountain Trembles

On April 3, a new type of seismic activity, a harmonic tremor, was recorded. Harmonic tremors are a continuous vibration of the earth caused by the movement of molten rock or "magma" beneath the volcano. A section of the north side of the mountain began to swell by as much as 4 to 5 feet a day from forces within the mountain. Minor earthquakes, eruptions of steam and ash, and other activity alternated with quiet periods.

## A Gigantic Explosion

Practically without warning, Mount St. Helens erupted early Sunday morning, May 18th. The eruption began with a gigantic explosion which hurled approximately one cubic mile of pulverized rock and ash almost 14 miles into the atmosphere. The force of the blast flattened trees and other vegetation in a fan-shaped area 8 miles long and 15 miles wide to the north of the mountain. Trees were uprooted, or snapped off at ground level, stripped of their limbs and layed flat like millions of dominoes spreading out from the crater. With the blast, came fast-moving flows of superheated steam, ash, and gases incinerating vegetation in its path and starting forest fires on

the mountain's flanks. Mud flows created by melted glacial ice and snow coursed down the mountain's sides to the north, flooding into the Toutle and Cowlitz River drainages. The flows gouged and filled the land into new forms as it moved.

Steam from the heated waters of what was once Spirit Lake rose as huge plumes in the air. As of mid July, 28 deaths were immediately attributed to the hot gases and ash with 36 persons still missing.

## A Blanket of Ash

Blown to the east by prevailing winds, ash from the eruption began a course across the United States. Cities in its immediate path, like Yakima, Washington, some 80 miles away were heavily blanketed by the ash. For hours after the eruption, ash blanketed out the sun over cities in Washington turning broad daylight to darkness. Within 4 days, ash from the eruption had reached the East Coast. The largest ash cloud reached over 63,000 feet and was traced around the world.

Once an alpine gem, St. Helens Lake before...



Huge trees six feet or more in diameter lay toppled and jackstrawed over thousands of acres.



Relentless torrents of mud, water and debris knocked out many bridges.

... and after cataclysmic eruption.





explodes...



...unleashing an awesome destructive force...



...still filling a funereal sky hours later with towering ash plume.



Clouds part to reveal shocking spectacle of debris-filled Spirit Lake, a barren shoreline, and moon-like north slope of Mount St. Helens, its gigantic and steaming crater extending beneath overcast skies.

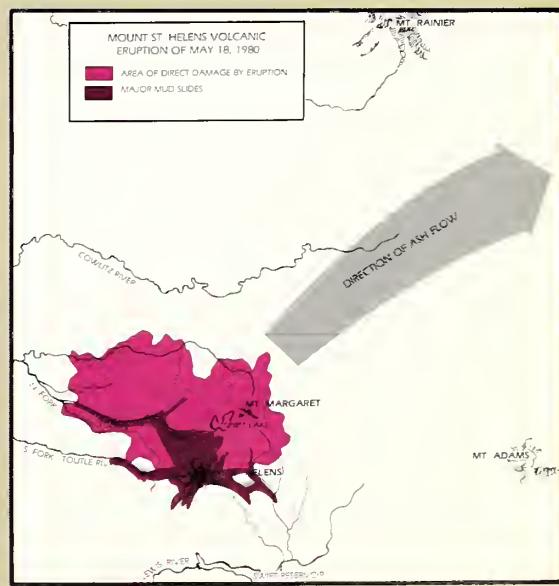
Dotted line indicates former profile of Mount St. Helens, as viewed from north. Eruption reduced peak's height from 9,677 feet to approximately 8,400 feet.



Several miles from crater, a seared, battered and twisted auto testifies to force of volcanic blast.



Lava dome rising in smouldering crater may hold secret to volcano's future.



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## Mount St. Helens – The Volcano

Mount St. Helens stands on, and partially conceals, the eroded remains of an earlier volcano active between 2,500 and 40,000 years ago. The mountain we see today has been formed over the last 2,500 years. Most of the upper part of the cone was built only 350-400 years ago.

Mount St. Helens is known as a "strato" volcano. It is composed of lava flows and fragmented material of pumice and other debris. A cross-section would reveal alternating layers of lava, ash, and rock debris.

Caves known as lava tubes are found within some lava flows. These are formed when a crust develops on the surface of a fresh stream of lava. When the lava flow subsides, the molten material drains away, leaving a hollow tube or cave. Ape Cave and many other smaller caves in the lava south of Mount St. Helens were formed this way.

Geologists know Mount St. Helens has had periods of volcanic activity alternating with periods of relative calm. Around 1800, a dormant period of about 150 years was broken by a voluminous pumice eruption.

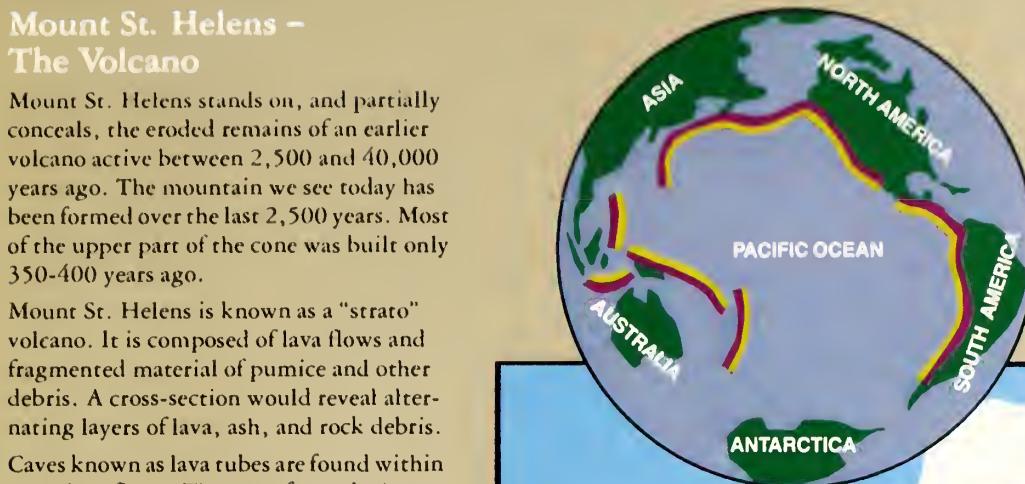
Mount St. Helens was then intermittently active until perhaps as late as 1857. Newspapers of that period carried eye witness accounts of these eruptions, which were especially frequent in the 1830s and 1840s. Whether or not the 1980 activity will continue for as long a period of time is not known.

## Earthquakes

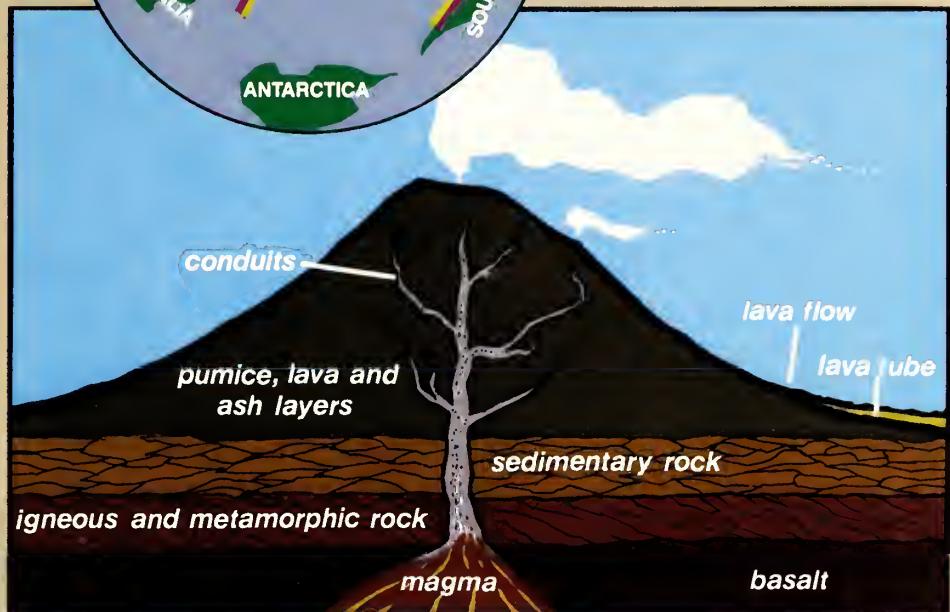
Earthquakes have been a regular feature of Mount St. Helens' volcanic activity. The first quake signaling renewed volcanic activity occurred on March 20, 1980. During the next 8 weeks, nearly 3,000 quakes were recorded with a magnitude of 3.0 or greater on the Richter Scale. Of these, over 371 were greater than 4.0 magnitude, with the largest one measuring 5.1.

On the Richter Scale, earthquakes are measured on a scale of 0 to 9.0. The magnitude number relates to the total energy released by an earthquake at its source. An earthquake of magnitude 4.5 or more is capable of causing some very local damage; one of 6.0 or more can be very destructive.

Here is a sample reading of Mount St. Helens' earthquake activity recorded on a seismograph. The magnitude of the quake is measured by how long it lasts on the horizontal line, not by how much the line moves vertically.



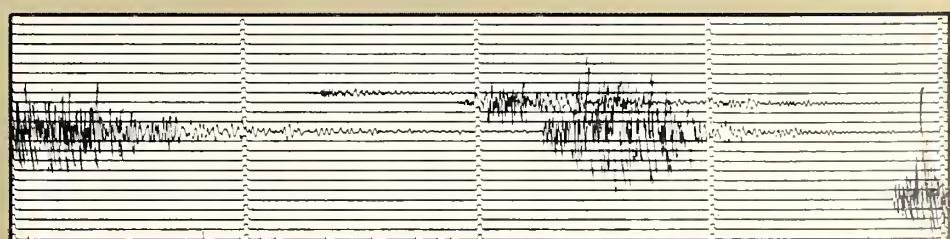
Mount St. Helens is part of a circle of known active volcanoes surrounding the Pacific Ocean. This circle of volcanic activity is known as the "Ring of Fire."



Cross section view of a "strato" volcano.



Major volcanoes of the Cascade Mountain Range.





Canadian artist Paul Kane witnessed Mount St. Helens volcanism in 1847, and later produced this painting of fiery night eruption watched from the west by awed Indians. Original painting hangs in Royal Ontario Museum, Ontario, Canada. Reproduced by Museum permission.

## Indian Lore

Northwest Indians told early explorers about the firey Mount St. Helens. In fact, an Indian name for the mountain, Louwala-Clough, means "smoking mountain."

According to one legend, the mountain was once a beautiful maiden, "Loowit". When two sons of the Great Spirit "Sahale" fell in love with her, she could not choose between them. The two braves, Wyeast and Klickitat, fought over her, burning villages and forests in the process. Sahale was furious. He smote the three lovers and erected a mighty mountain peak where each fell. Because Loowit was beautiful, her mountain (St. Helens) was a beautiful, symmetrical cone of dazzling white. Wyeast (Mt. Hood) lifts his head in pride, but Klickitat (Mt. Adams) wept to see the beautiful maiden wrapped in snow, so he bends his head as he gazes on St. Helens.

## Baron St. Helens

Mount St. Helens received its present title from Captain George Vancouver, a British explorer, in 1792. Captain Vancouver

named the mountain "in honor of his Britannic Majesty's Ambassador at the Court of Madrid," in October of that year as he viewed it from his ship at the mouth of the Columbia River. Baron St. Helens served as the British Ambassador to Spain from 1790 to 1794.

## For Your Safety

Volcanic activity can change drastically within a few minutes. Potential hazards include ash fallout, rapidly moving flows of mud (melted snow and ice mixed with ash), and "pyroclastic flows" made up of hot gases and lightweight volcanic particles such as pumice. These pyroclastic flows may skim along the mountain's surface like an avalanche. If caught in a heavy ash fall, make a face mask of cloth to filter the ash — it will be most effective if dampened. Many of the May 18 fatalities resulted from suffocation because fine ash filled the lungs.

Please keep informed of possible danger. Pay strict attention to all regulations. Be prepared to leave the area quickly if you notice threatening volcanic activity or if you receive word from the Forest Service or other government authority.

## For More Information

The Mount St. Helens Geological Area is part of the Gifford Pinchot National Forest, USDA, Forest Service. As one of 15 special Geological Areas in the National Forest System, it is being managed for public enjoyment and scientific study. Through visitor centers near Toledo and Ridgefield, Washington, the Forest Service offers information and interpretive programs to help you understand the special features of Mount St. Helens.

The goal of the Gifford Pinchot National Forest is to provide you an enjoyable and safe visit. Your cooperation will make this goal possible.

Further information may be obtained from:  
**Gifford Pinchot National Forest**  
 500 W. 12th Street  
 P.O. Box 449  
 Vancouver, Washington 98660  
 (206) 696-7500

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